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Serial No. 10/531,113
Art Unit: 1793

AMENDMENTS TO THE CLAIMS

What is claimed is:

1. – 17. (Cancelled)

18. (Currently Amended) A process solution for pickling steel comprising:

- a) one or more strong acids other than the complex fluoro acids of group c), and different from nitric acid, in a total concentration of at least 10 g/l and at most 200 g/l,
 - c) one or more complex fluoro acids of Si and/or anions thereof in concentrations from 50 to 500 mmoles per liter,
 - e) iron(III) cations in concentrations from at least 3 g/l to at most 100 g/l,
 - f) a total of from 0.1 to 10 g/l of chloride ions and/or hydrochloric acid, and, optionally,
 - d) a hydrogen peroxide stabilizer,
- the process solution containing in addition an amount of fluoride ions and/or hydrofluoric acid such that at least 1 % and up to 100 % of the iron(III) ions are present in the form of fluoride complexes, but such that the process solution contains less than 10 g/l of free fluoride ions and/or free hydrofluoric acid.

19. (Previously Presented) The process solution according to claim 18 which contains no other oxidizing agent than the iron(III) cations and dissolved oxygen, said iron (III) cations concentration being at least 5 g/l, and the concentration of c) being at least 170 mmoles per liter.

20. (Previously Presented) The process solution according to claim 18 which has a redox potential, measured at process solution working temperature with a Pt/Ag/AgCl

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electrode, of at least 280 mV and up to 800 mV.

21. (Previously Presented) The process solution according to claim 20, wherein the strong acids other than the complex fluoro acids of group c) are selected from sulfuric acid, phosphoric acid, and mixtures thereof.

22. (Previously Presented) The process solution according to claim 20, wherein the process solution is in the form of a gel or a paste.

23. (Previously Presented) A process for pickling steel, comprising:

- contacting steel with a process solution according to claim 18 for a time sufficient to obtain a completely de-scaled surface; and
- managing redox potential of the process solution such that the redox potential, measured at process solution working temperature with a Pt/Ag/AgCl electrode, is at least 280 mV and up to 800 mV.

24. (Previously Presented) The process according to claim 23 wherein the process solution is moved relative to the surface of the steel.

25. (Previously Presented) The process according to claim 23 wherein at least a fraction of the iron(II) ions formed during the pickling are oxidized to iron(III) ions.

26. (Currently Amended) A process for pickling steel, comprising:

- contacting steel with a pickling process solution comprising:
 - a) one or more strong acids other than the complex fluoro acids of group c), and different from nitric acid, in a total concentration of at least 10 g/l and at most 200 g/l,
 - c) one or more complex fluoro acids of Si and/or anions thereof in concentrations from 50 to 500 mmol per liter,

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e) iron(III) cations in concentrations from at least 3 g/l to at most 100 g/l,
and, optionally,

d) a hydrogen peroxide stabilizer,

the pickling process solution containing in addition an amount of fluoride ions and/or hydrofluoric acid such that at least 1 % and up to 100 % of the iron(III) ions are present in the form of fluoride complexes, but such that it contains less than 10 g/l of the total of free fluoride ions and/or free hydrofluoric acid, said contacting being for a time sufficient to obtain a completely de-scaled surface.

27. (Previously Presented) The process to claim 26 wherein the process solution contains no other oxidizing agent than the iron(III) ions and dissolved oxygen.

28. (Previously Presented) The process according to claim 26 wherein the process solution additionally contains a total of from 0.1 to 10 g/l of chloride ions and/or hydrochloric acid.

29. (Previously Presented) The process according to claim 26 further comprising the step of managing redox potential of the process solution such that the redox potential, measured at its working temperature with a Pt/Ag/AgCl electrode, of at least 280 mV and up to 800 mV.

30. (Currently Amended) The process according to claim 26 wherein the process solution is moved relative ~~relatively~~ to the surface of the steel.

31. (Previously Presented) The process according to claim 26 wherein the concentration of e) iron(III) cations is from at least 5 g/l, to at most 60 g/l and the process solution contains an amount of fluoride ions and/or hydrofluoric acid such that it contains less than 5 g/l of the total of free fluoride ions and/or free hydrofluoric acid.

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32. (Currently Amended) A process for brightening and/or passivating pickled surfaces of stainless steel, comprising:

-contacting pickled stainless steel surfaces with a process solution comprising:

- a) one or more strong acids other than the complex fluoro acids of group c),
- b) one or more oxidizing agents,
- c) one or more complex fluoro acids of elements of groups 4, 13, or 14 of the periodic table of the chemical elements and/or anions thereof in concentrations from 50 to 220 ~~300~~ mmol per liter; and

-rinsing the pickled stainless steel surfaces after said contacting.

33. (Previously Presented) The process for brightening and/or passivating of pickled surfaces of stainless steel according to claim 32 wherein the oxidizing agent b) is selected from compounds containing a peroxo-group, said process solution further comprising d) a hydrogen peroxide stabilizer.

34. (Previously Presented) The process for brightening and/or passivating of pickled surfaces of stainless steel according to claim 33, wherein

- a) the strong acid is present in a concentration from 2 to 100 g/l, and
- b) the oxidizing agent is present in a concentration, expressed as the equivalent concentration of H_2O_2 , in the range from 1 to 30 g/l.

35. (Currently Amended) The process for brightening and/or passivating of pickled surfaces of stainless steel according to claim 32 ~~claim 35~~ wherein c) comprises one or more complex fluoro acids of Si and/or anions thereof.

36. (New) A process solution comprising:

- a) one or more strong acids other than the complex fluoro acids of group c), and

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different from nitric acid, in a total concentration of at least 10 g/l and at most 200 g/l,
c) one or more complex fluoro acids of Si and/or anions thereof in concentrations from 30 to 220 mmoles per liter,

e) iron(III) cations in concentrations from at least 3 g/l to at most 100 g/l,

f) a total of from 0.1 to 10 g/l of chloride ions and/or hydrochloric acid,
and, optionally,

d) a hydrogen peroxide stabilizer,

the process solution containing in addition an amount of fluoride ions and/or hydrofluoric acid such that at least 1 % and up to 100 % of the iron(III) ions are present in the form of fluoride complexes, but such that the process solution contains less than 10 g/l of free fluoride ions and/or free hydrofluoric acid.